2011
Restoration Thinning (As-Built) Project Report
Cedar River Municipal Watershed

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1.0 Background

Upland Restoration Thinning (RT) is the active ecologically-driven treatment of relatively young and dense second-growth forests that have relatively low biological diversity and are in or approaching the competitive exclusion stage of forest succession. The RT program in the Cedar River Municipal Watershed (CRMW) was established by the Cedar River Watershed Habitat Conservation Plan (CRW-HCP) in the year 2000 with the goal of developing complex habitat and accelerating late-successional forest habitat characteristics. Prior to that time, an analogous pre-commercial thinning program treated young forest stands in the CRMW with commercial forestry goals (e.g., maximizing individual tree growth for future harvest by creating evenly spaced trees, often of a single species). The RT program is defined more specifically in the Cedar River Municipal Watershed Upland Forest Habitat Restoration Strategic Plan (2008), and treatment priorities are specified in the Landscape Synthesis Framework for the Cedar River Watershed Habitat Conservation Plan (2009). Through the planning process that developed these detailed documents, RT treatment units were identified based on their current age, height, and stand condition, and prioritized based on their proximity to highly valued habitat (e.g., old-growth forest, riparian and wetland areas).

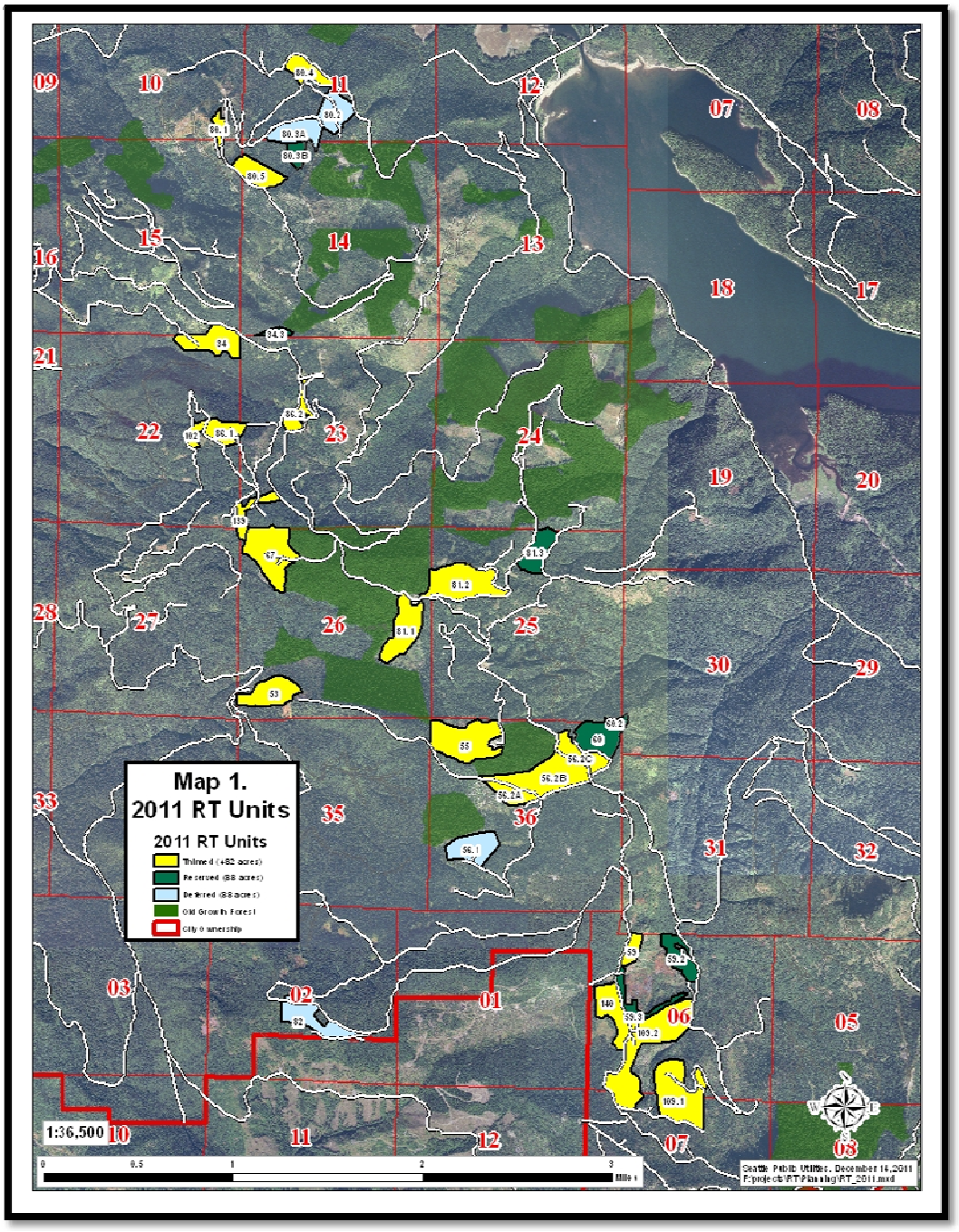
RT projects have been implemented in the CRMW since 2000, with planning and implementation occurring on an annual cycle. Treatment prescriptions have evolved through an adaptive management process as project monitoring informs whether goals and objectives are being attained. Budgeting for RT projects under the CRW-HCP is scheduled to sunset in 2015, defining an implementation schedule and treatment quota. This plan provides descriptions and treatment plans for individual forest units identified for treatment in 2011. The RT budget and area of treatment target for 2011 was $150,000 and 430 acres, respectively.

1.1 2011 RT Project Overview

The area prioritized for RT in 2011 was the Upper Taylor Basin, including young forest stands in the 60, 200, and 800 road systems. Significant old-growth forest and special habitat areas (e.g., meadows, talus slopes, and lakes) are present throughout the basin. RT treatments (e.g., thinning specified tree species with diameter limits, preserving areas in small skips and larger reserves, making small gaps) are an effort to complement habitat structure types that are already present. Twenty-four RT units (570 acres) were identified for treatment in the basin through the Landscape Synthesis Framework and validated through extensive site recognizance (Map 1). Seven other units (88 acres) were designated as unthinned reserves because they did not meet RT treatment criteria (e.g., the tree density was low, trees were too big, relatively small area, location on the landscape). Higher ranked units in the basin have primarily already been treated.

Old-growth forest habitat in the basin may provide nesting habitat for CRW-HCP species (e.g., marbled murrelet, northern spotted owl, northern goshawk). RT treatments in units (351 acres) in close proximity to nesting habitat were deferred until after the nesting season (August 31st). Relatively high snow accumulation from the winter of

2010-11 limited access to the basin until late in the Spring/Summer season, which rendered deferment largely moot (thinning started on October 4th).
Twenty units (482 acres) were treated in 2011 before snow limited access to higher elevations in the watershed on November 3rd. Treatment of the four remaining units (88 acres) was been deferred until 2012. Two of the units (56.1 and 82) have already been awarded to a treatment contractor (Ramon Coronel Reforestation).



2.0 Goals and Objectives

The overarching goal of RT is to accelerate the development of complex habitat in the near-term and late-successional and old-growth forest conditions in the long-term. Objectives of RT include:

- Reduce competition among trees.
- Stimulate tree growth.
- Increase light penetration under the top tree canopy.
- Increase tree and understory plant species diversity.
- Accelerate forest development beyond the competitive exclusion stage towards a more biologically diverse stage.
- Extend the forest development stand initiation stage such that diverse species become established and diverse stand structures develop.
- Reduce long-term fire hazard.
- Increase resilience to catastrophic windthrow, insect, or disease outbreak.

Additional ecological objectives considered in 2011, including methods developed to achieve those objectives are to:

- Provide multiple development pathways for variable forest stand structures.
    - Variable residual tree densities and tree sizes; stand scale reserves; numerous skips.
- Increase connectivity and structural variability of riparian areas; minimize sediment from entering streams.
    - Buffer or retain higher tree densities along streams and inner gorges.
- Create varied stand structures adjacent to old-growth forests and special habitats.
    - Alternate dense and sparse thinning densities next to old growth; incorporate special habitats or key landscape features as skips or create variable treatments around special habitats; remove slash from dispersal corridors.
- Maintain cultural resources.
    - Inform restoration thinning crews of cultural resource protection protocol; monitor work with a sensitivity to cultural resources.

2.1 Landscape Perspective

Each unit can be characterized by its unique features and how it relates to other features on the landscape. The Upper Taylor Basin, for example, contains many unique features such as lakes, talus slopes, rock outcroppings, and shrub openings, as well as stands of old-growth forests adjacent to and within the landscape planning area. Three

key landscape criteria shaped the thinking behind individual thinning prescriptions including decisions to place areas in a Reserve:

- Individual unit objectives and unique features, i.e. What special characteristics does a particular unit have when compared to other units and how should the unit objectives be tailored to protect, enhance, and promote those features?
- The location and characteristics of old-growth forests and special habitats relative to the thinning units, i.e. What locations and characteristics of nearby old growth and special habitats are unique that we should consider them in the prescriptions?
- The proximity and location to previously thinned stands, i.e. What should be done differently now considering the prescriptions and ecological response of nearby previously thinned stands?

Additional details can be found on the maps of each thinning unit later in this report.

3.0 Costs, Area Treated, and Compliance

For 2011 the total area treated was 482 acres at a cost of $95,004.00 for an average cost per acre of $197.10 (Table 1). Cost per acre for thinning range from $117 to $328. All work was paid at an hourly rate that was bid prior to the start of work. The "cost to contractor" reflects the actual amount of work required to complete the prescription, while the "amount paid" reflects the not-to-exceed amount established at 125% of the respective contractors bid price.

Compliance plots were measured at a density of at least one plot for every two acres of treatment with a minimum of five plots per unit. Plots were intended to be distributed throughout the unit. Treatment quality of only one of the units (139) caused a financial penalty to the contractor. Deficiencies in this unit were primarily caused by ignoring the maximum diameter of trees to be thinned.

Table 1. Costs, acres, treatment quality by unit for 2011 Restoration Thinning.

Unit	Acres	Cost to Contractor ($)		Amount Paid ($)*		% Quality
		Total	Cost/Acre	Total	Cost/Acre	
34	25	3,515.00	140.60	3,515.00	140.60	NA†
53	23	3,634.50	158.02	3,634.50	158.02	89.7
55	42	8,439.50	200.94	8,439.50	200.94	97.5
56.2A	12	1,406.00	117.17	1,406.00	117.17	100.0
56.2B	40	6,798.00	169.95	6,798.00	169.95	99.3
56.2C	17	2,812.00	165.41	2,812.00	165.41	98.0
59‡	9	1,772.00	196.89	1,500.00	166.67	97.6
67	38	7,845.50	206.46	7,845.50	206.46	94.9
80.1	5	703.00	140.60	703.00	140.60	95.1
80.4	15	4,921.00	328.07	4,921.00	328.07	95.8
80.5	17	4,689.00	275.82	4,689.00	275.82	100.0
81.1	28	4,334.00	154.79	4,334.00	154.79	96.8
81.2‡	39	6,544.00	167.79	7,200.00	184.62	99.4
86.1	14	2,812.00	200.86	2,812.00	200.86	94.1
86.2	11	3,170.50	288.23	3,170.50	288.23	100.0
102	6	1,757.50	292.92	1,757.50	292.92	100.0
109.1‡	45	10,409.75	231.33	7,650.00	170.00	97.4
109.2‡	60	13,691.75	228.20	12,400.00	206.67	97.1
139	12	3,866.50	322.21	3,866.50	322.21	77.8
140‡	24	5,316.00	221.50	5,550.00	231.25	98.9
Total	**482**	**98,437.50**	**204.23**	**95,004.00**	**197.10**	**96.5**

*Based on cost or Not-To-Exceed (NTE) amount, whichever is less for the suite of units for each contractor.

†End of season snow prohibited access.

‡Contracted to Ramirez Reforestation, all others are Coronel Reforestation.

4.0 Unit Summaries

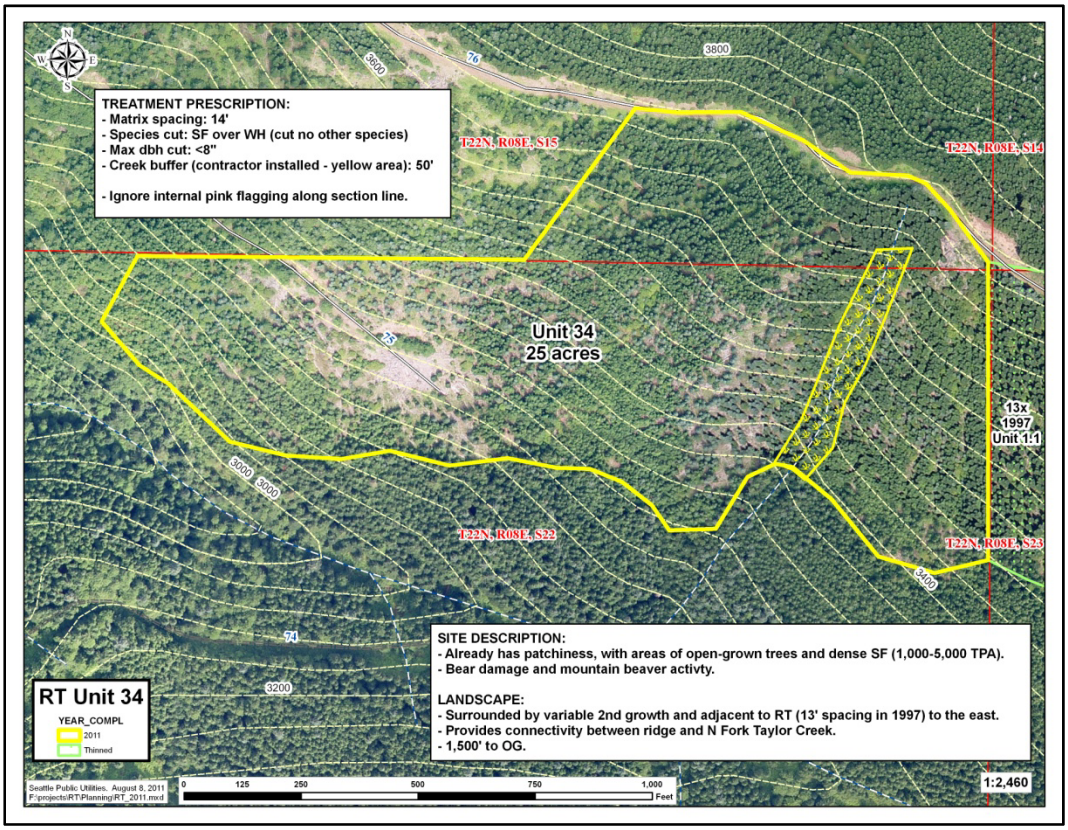
This section provides the following information specific to each unit. Table 2 summarizes unit information, treatments, and post-thinning tree densities. The table also shows information for units deferred until 2012 and units designated as reserve (or untreated). The following are 18 maps showing the 20 thinned units.

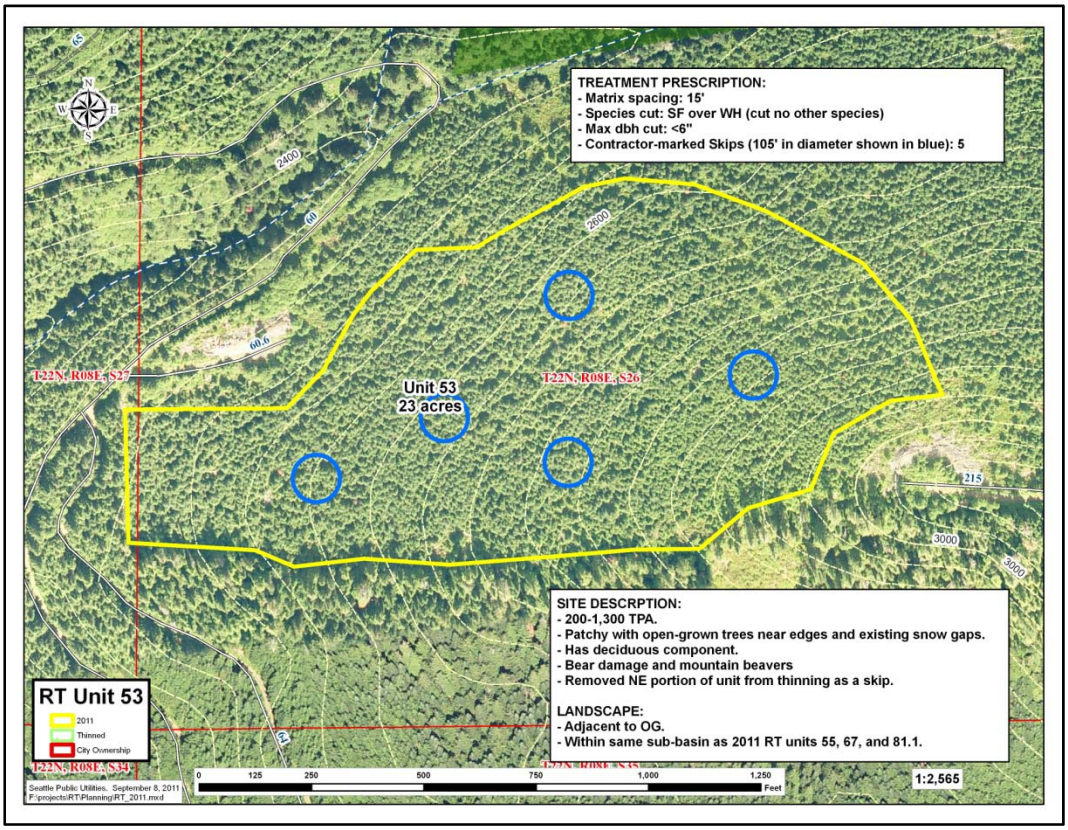
Table 2. 2011 restoration thinning unit data.

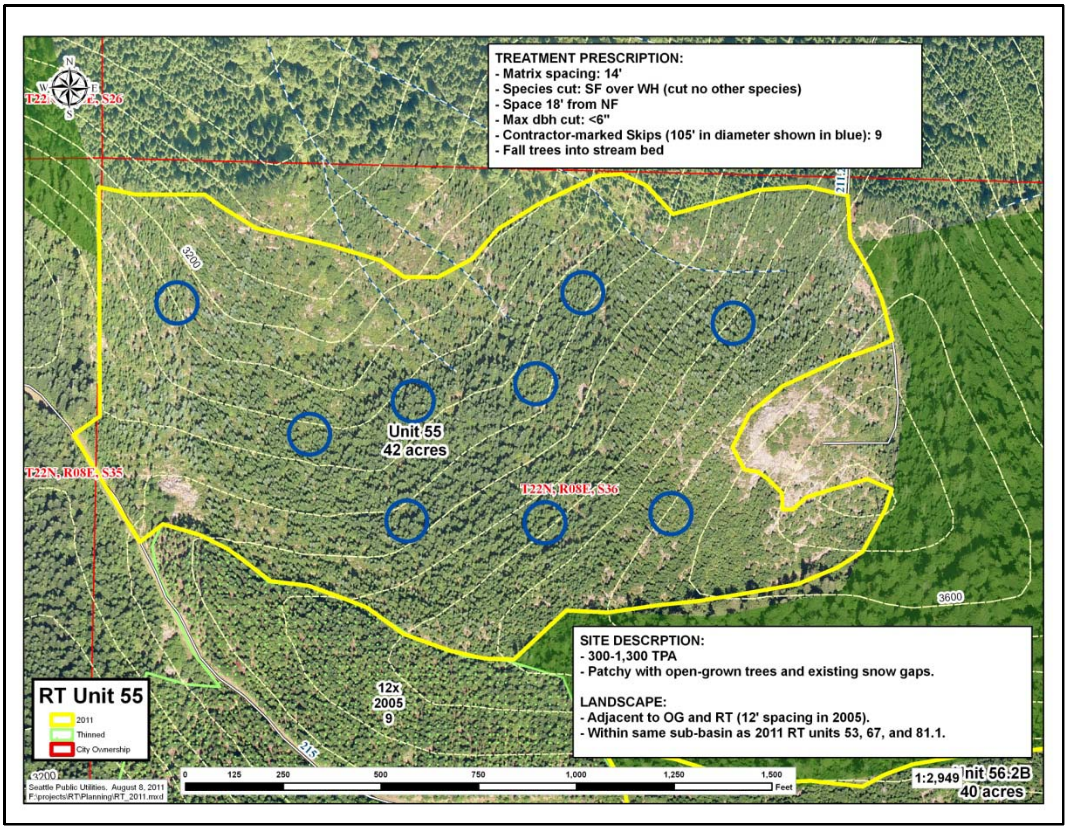
Treatment	Unit	Acres	Location			Elevation (')	Road Access	Matrix Prescription			Skips				Prescription Comments	Compliance		Post-Thinning Matrix Trees/Acre (TPA)								
			T	R	S			Spacing (')	Species Cut	Max dbh	# Circles (d=105')	Buffer Acres	Total Acres	% of Unit		# Plots	Quality (%)	ABAM	TSHE	PSME	THPL	ABPR	ALRU	Total	Minimum	Maximum
Thinned	**34**	25	22	8	22	2,960 - 3,760	76	14'	ABAM TSHE	<8"	0	0.9	0.9	3.6	50' stream buffers.	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	53	23	22	8	26	2,400 - 3,120	60, 215	15	ABAM TSHE	<6"	5	0.0	1.0	4.3	Bear damage of PSME.	11	89.7	14	214	200	9	0	0	436	200	750
	55	42	22	8	36	3,120 - 3,680	215	14'	ABAM TSHE	<6"	9	0.0	1.8	4.3		22	97.5	145	93	2	14	27	0	282	200	450
	56.2A	12	22	8	36	3,200 - 3,360	215	14'	ABAM TSHE	<6"	3	0.0	0.6	5.0		6	100	75	200	67	0	0	25	367	250	550
	56.2B	40	22	8	36	3,160 - 3,440	215	14'/ 16'	ABAM TSHE	<7"	15	0.0	3.0	7.5	16' spacing except 14' within 100' of OG; four 30'-wide slash-free corridors.	20	99.3	233	65	38	15	0	0	350	200	550
	56.2C	17	22	8	36	3,040 - 3,200	211	14'	ABAM TSHE	<6"	4	0.9	1.7	10.0	50' stream buffer.	9	98.0	111	100	33	22	0	11	278	200	350
	59	9	21	9	6	3,220 - 3,440	211	14'	ABAM TSHE	<7"	2	0.0	0.4	4.4		5	97.6	160	80	0	160	0	10	410	250	800
	67	38	22	8	26	3,040 - 3,800	816	15'	ABAM TSHE	<5"	6	2.1	3.3	8.7	25' stream buffers; thinned under adjacent OG canopy.	19	94.9	218	21	37	0	0	0	276	200	500
	80.1	5	22	8	10	3,320 - 3,520	860	13'	ABAM TSHE	<6"	2	0.0	0.4	8.0		5	95.1	340	30	10	0	10	0	390	250	550
	80.4	15	22	8	11	2,600 - 2,880	800, 820	15'	ABAM TSHE	<8"	4	0.0	0.8	5.3	Within spacing, fell trees <5" and girdle trees 5-8".	8	95.8	269	75	63	0	19	0	425*	300	500
	80.5	17	22	8	14	3,160 - 3,560	860	15'	ABAM TSHE	<6"	7	0.0	1.4	8.2	Created linear skip along NW boundary.	9	100	344	94	72	0	0	0	511	350	750
	81.1	28	22	8	26	2,740 - 3,440	815	13'	ABAM TSHE PSME	<6"	4	5.4	6.2	22.1	50' stream buffers.	14	96.8	104	54	161	25	0	0	343	200	500
	81.2	39	22	8	25	3,480 - 4,040	815	15'	ABAM TSHE	<7"	14	0.0	2.8	7.2		20	99.4	370	28	25	3	0	0	425	250	650
	86.1	14	22	8	22	3,640 - 4,000	60	15'	ABAM TSHE	<8"	6	0.0	1.2	8.6	Buffered adjacent stream with boundary.	7	94.1	314	29	0	0	0	0	343	300	400
	86.2	11	22	8	23	3,760 - 3,920	76, 76.1	14'/ 18'	ABAM TSHE	<7"	2	0.2	0.6	5.5	14' spacing except 18' near huckleberries; 25' buffer along cliff.	6	100	617	8	0	0	0	0	625	450	800
	102	6	22	8	22	3,440 - 3,640	60	14'	ABAM TSHE	<8"	0	0.0	0.0	0.0		6	100	250	67	0	0	0	0	317	250	400
	109.1	45	21	9	6	3,440 - 3,640	210.6, 211.3B	15'	ABAM TSHE	<6"	9	4.1	5.9	13.1	50' stream buffers; avoid inner gorge with boundary.	23	97.4	237	57	4	26	2	0	326	200	550
	109.2	60	21	9	6	2,760 - 3,680	210, 211.3	14'	ABAM TSHE	<7"	17	3.2	6.6	11.0	50' stream buffers; avoid inner gorge with boundary.	30	97.1	220	112	22	5	0	0	358	200	850
	139	12	22	8	23	3,680 - 3,920	68	14'	ABAM	<7"	4	0.0	0.8	6.7	Fell trees into Jury Lake for amphibian habitat.	10	77.8	365	5	0	0	15	0	385	150	550
	140	24	21	9	6	3,400 - 3,520	211	14'	ABAM TSHE	<8"	4	0.0	3.5	14.4	Three skip corridors (2.65 acres).	13	98.9	181	131	31	0	0	4	346	200	600
	Subtotal	482									117	16.8	42.9	8.9		243	96.5	*Plus 419 girdled trees/acre.								

Deferred	**56.1**	23	22	8	36	2,920 - 3,280	215.1A	14'	ABAM TSHE	<6"	3	1.1	1.7	7.4	25' stream buffer; two 95'-diameter gaps.		
	80.2	20	22	8	11	2,640 - 3,360	800, 850	14'	ABAM TSHE	<7"	6	0.0	1.2	6.0			
	80.3A	20	22	8	11	3,240 - 3,680	850	14'	ABAM TSHE	<7"	7	0.0	1.4	7.0			
	82	25	21	8	2	3,280 - 3,760	64	14'	ABAM TSHE	<7"	4	0.0	0.8	3.2	Skipped area of open-grown trees.		
	Subtotal	88									20	1.1	5.1	5.8			
Reserved	**34.3**	4	22	8	14	3,880 - 4,080	76						4	100	Relatively small area; at the top of a knoll; surrounded by stands with variable tree ages and densities.		
	53A	32	22	8	26	2,400 – 3.120	60, 215						32	100	Variable in tree species and density; open-grown trees; bear damage on PSME.		
	59.2	16	21	9	6	2,600 - 2,920	210						16	100	Taller trees; buffers steep rocky area; open-grown trees; high species diversity; bear damage.		
	59.3	15	21	9	6	2,800 - 3,520	211						15	100	Buffers above steep rocky open area; open-grown trees; very steep.		
	60.1	23	22	8	36	2,800 - 3,120	216.1 decom						23	100	Already has high species diversity; bear damage on DF.		
	60.2	4	22	8	25	2,920 - 3,160	216.1 decom						4	100	Trees are too tall for RT (up to 60').		
	80.3B	8	22	8	14	3,450-3,650	860						8	100	Trees are already relatively large and well-spaced.		
	81.3	18	22	8	25	3,400 - 3,760	211.2E decom						18	100	Decommissioned access road.		
	Subtotal	88											120	100.0			
Total		**690**									**137**	**18**	**168**	**24.3**			

Maps of Thinned Units:






TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF over WH (cut no other species)
- Space 18' from NF
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 9
- Fall trees into stream bed
Unit 55
42 acres
T22N, R08E, S35
T22N, R08E, S36
SITE DESCRPTION:
- 300-1,300 TPA
- Patchy with open-grown trees and existing snow gaps.
LANDSCAPE:
- Adjacent to OG and RT (12' spacing in 2005).
- Within same sub-basin as 2011 RT units 53, 67, and 81.1.
RT Unit 55
2011
Thinned
City Ownership
12x
2005
9
1:2,949
Unit 56.2B
40 acres
Seattle Public Utilities, August 8, 2011
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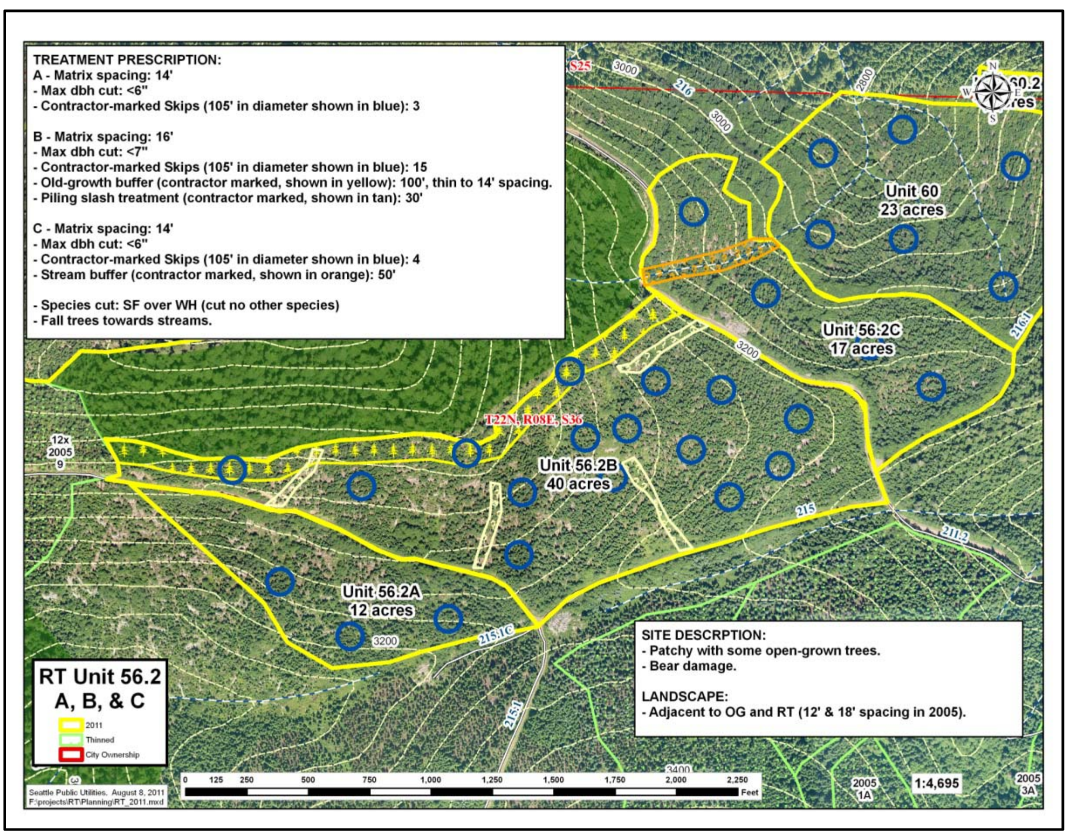
TREATMENT PRESCRIPTION:
A - Matrix spacing: 14'
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 3
B - Matrix spacing: 16'
- Max dbh cut: <7"
- Contractor-marked Skips (105' in diameter shown in blue): 15
- Old-growth buffer (contractor marked, shown in yellow): 100', thin to 14' spacing.
- Piling slash treatment (contractor marked, shown in tan): 30'
C - Matrix spacing: 14'
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 4
- Stream buffer (contractor marked, shown in orange): 50'
- Species cut: SF over WH (cut no other species)
- Fall trees towards streams.
Unit 60
23 acres
Unit 56.2C
17 acres
T22N, R08E, S36
Unit 56.2B
40 acres
Unit 56.2A
12 acres
SITE DESCRPTION:
- Patchy with some open-grown trees.
- Bear damage.
LANDSCAPE:
- Adjacent to OG and RT (12' & 18' spacing in 2005).
RT Unit 56.2
A, B, & C
2011
Thinned
City Ownership
1:4,695
Seattle Public Utilities, August 8, 2011
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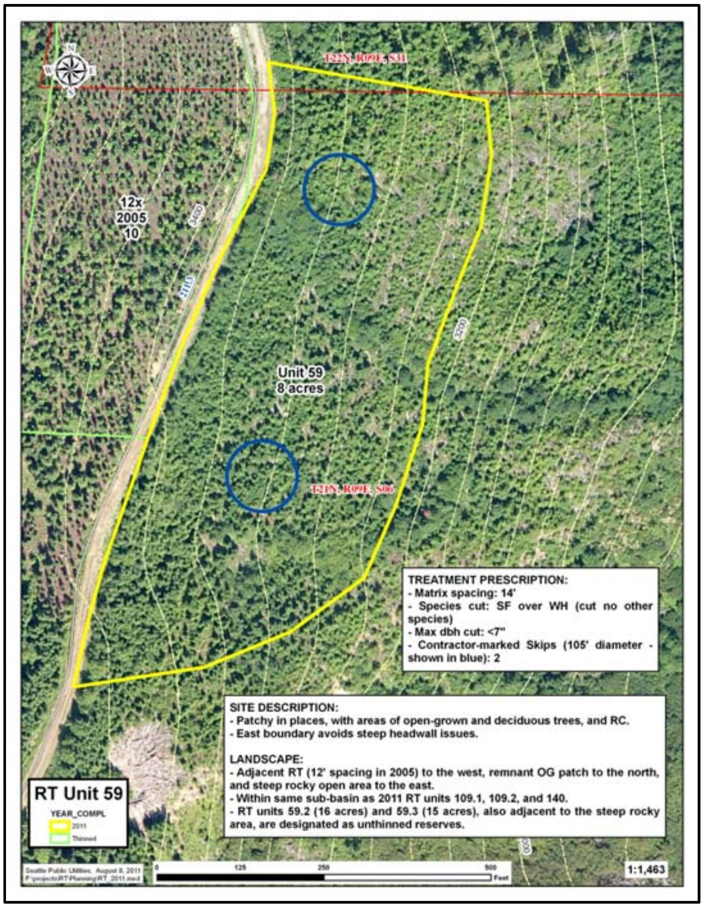
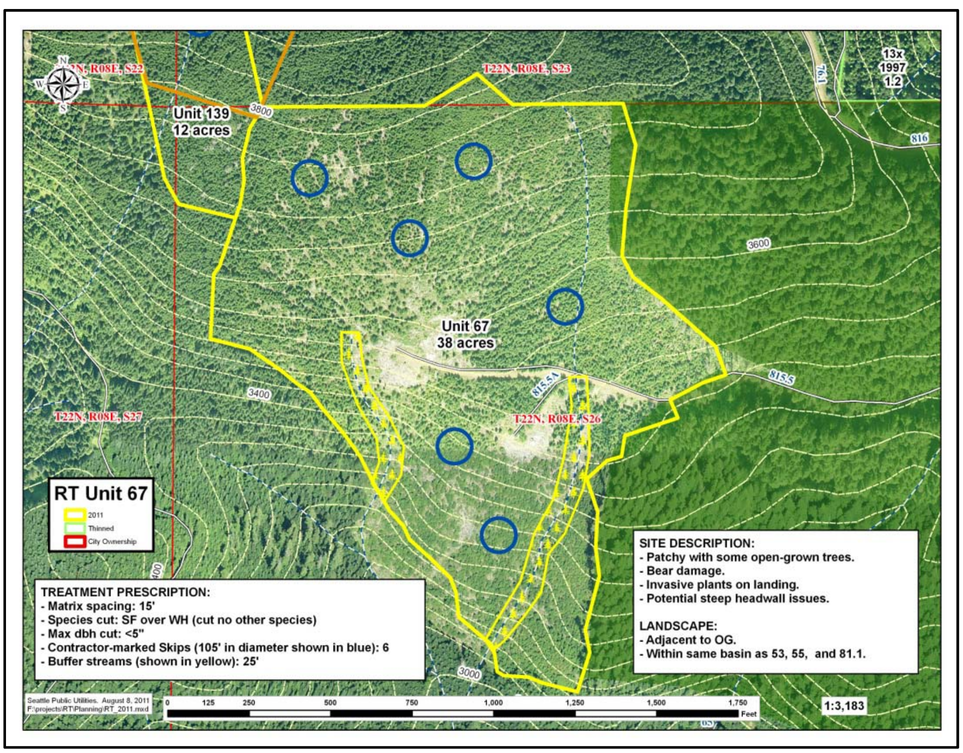
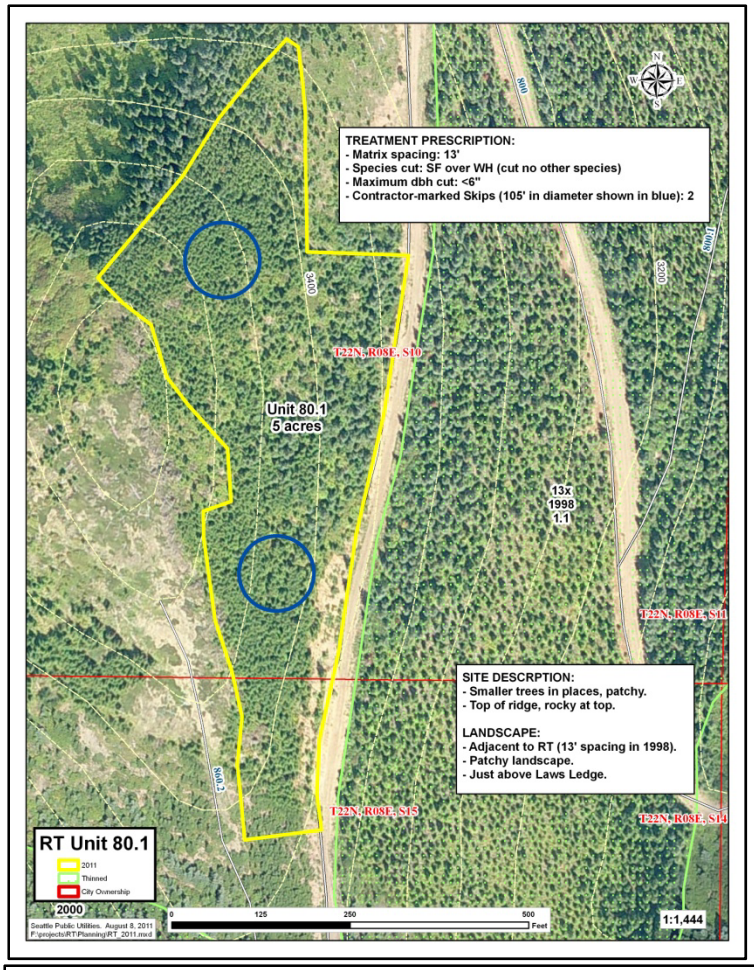

T22N, R09E, S31
12x
2005
10
3400
Unit 59
8 acres
3200
T21N, R09E, S06
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <7"
- Contractor-marked Skips (105' diameter - shown in blue): 2
SITE DESCRIPTION:
- Patchy in places, with areas of open-grown and deciduous trees, and RC.
- East boundary avoids steep headwall issues.
LANDSCAPE:
- Adjacent RT (12' spacing in 2005) to the west, remnant OG patch to the north, and steep rocky open area to the east.
- Within same sub-basin as 2011 RT units 109.1, 109.2, and 140.
- RT units 59.2 (16 acres) and 59.3 (15 acres), also adjacent to the steep rocky area, are designated as unthinned reserves.
RT Unit 59
YEAR_COMPL
2011
Thinned
Seattle Public Utilities. August 8, 2011
0
125
250
500
Feet
1:1,463


T22N, R08E, S23
13x
1997
1.2
3800
Unit 139
12 acres
816
3600
Unit 67
38 acres
815.5
3400
T22N, R08E, S27
T22N, R08E, S26
RT Unit 67
2011
Thinned
City Ownership
SITE DESCRIPTION:
- Patchy with some open-grown trees.
- Bear damage.
- Invasive plants on landing.
- Potential steep headwall issues.
LANDSCAPE:
- Adjacent to OG.
- Within same basin as 53, 55, and 81.1.
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <5"
- Contractor-marked Skips (105' in diameter shown in blue): 6
- Buffer streams (shown in yellow): 25'
3000
Seattle Public Utilities. August 8, 2011
0
125
250
500
750
1,000
1,250
1,500
1,750
Feet
1:3,183


TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Species cut: SF over WH (cut no other species)
- Maximum dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 2
Unit 80.1
5 acres
T22N, R08E, S10
T22N, R08E, S11
T22N, R08E, S15
T22N, R08E, S14
13x
1998
1.1
SITE DESCRPTION:
- Smaller trees in places, patchy.
- Top of ridge, rocky at top.
LANDSCAPE:
- Adjacent to RT (13' spacing in 1998).
- Patchy landscape.
- Just above Laws Ledge.
RT Unit 80.1
2011
Thinned
City Ownership
2000
0 125 250 500 Feet
1:1,444
Seattle Public Utilities. August 8, 2011
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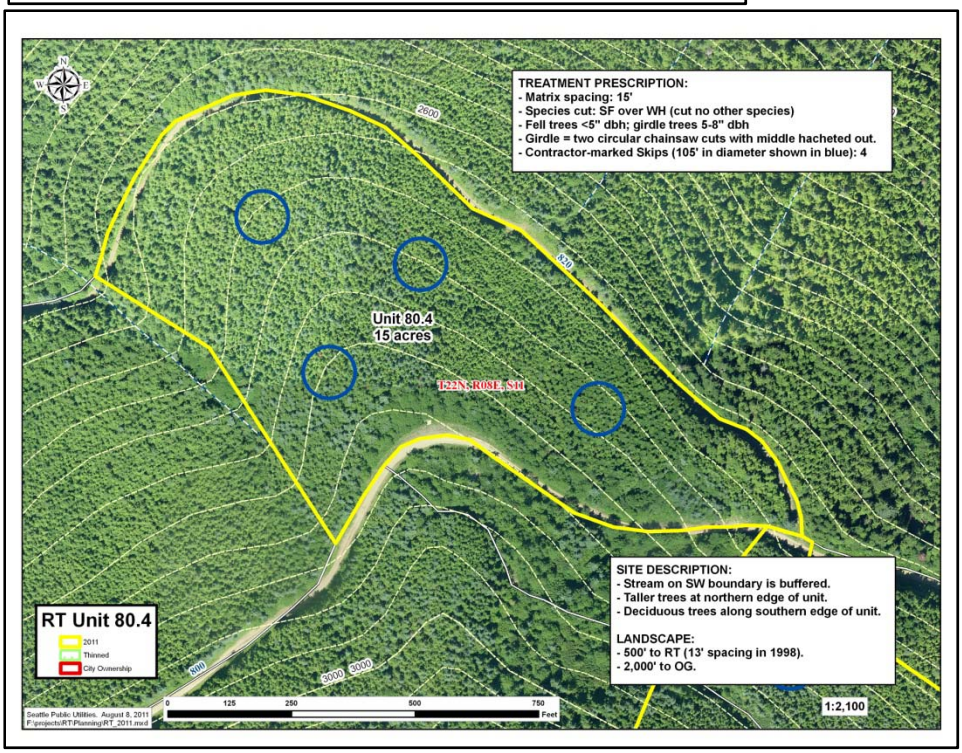
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Fell trees <5" dbh; girdle trees 5-8" dbh
- Girdle = two circular chainsaw cuts with middle hacheted out.
- Contractor-marked Skips (105' in diameter shown in blue): 4
Unit 80.4
15 acres
T22N, R08E, S11
SITE DESCRIPTION:
- Stream on SW boundary is buffered.
- Taller trees at northern edge of unit.
- Deciduous trees along southern edge of unit.
LANDSCAPE:
- 500' to RT (13' spacing in 1998).
- 2,000' to OG.
RT Unit 80.4
2011
Thinned
City Ownership
0 125 250 500 750 Feet
1:2,100
Seattle Public Utilities. August 8, 2011
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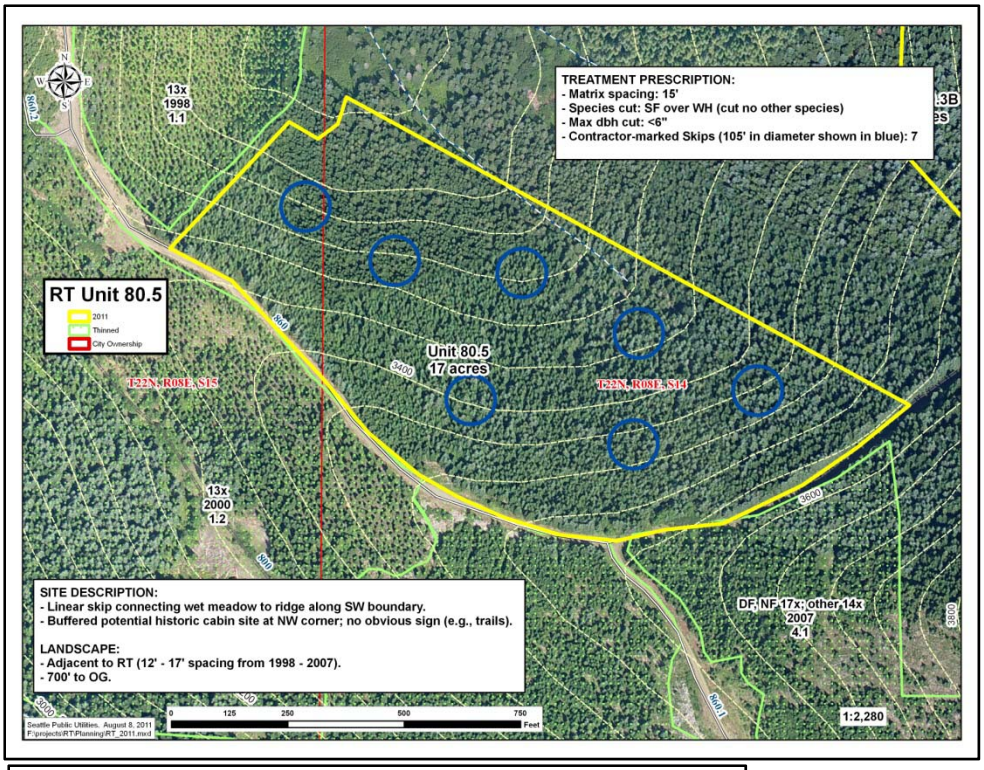
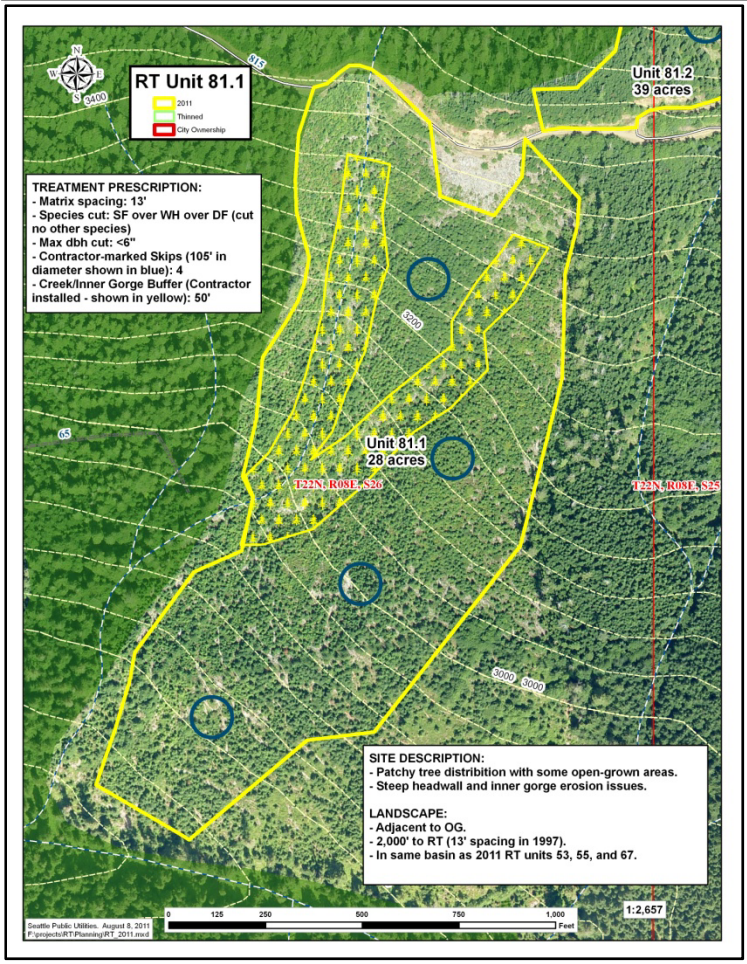
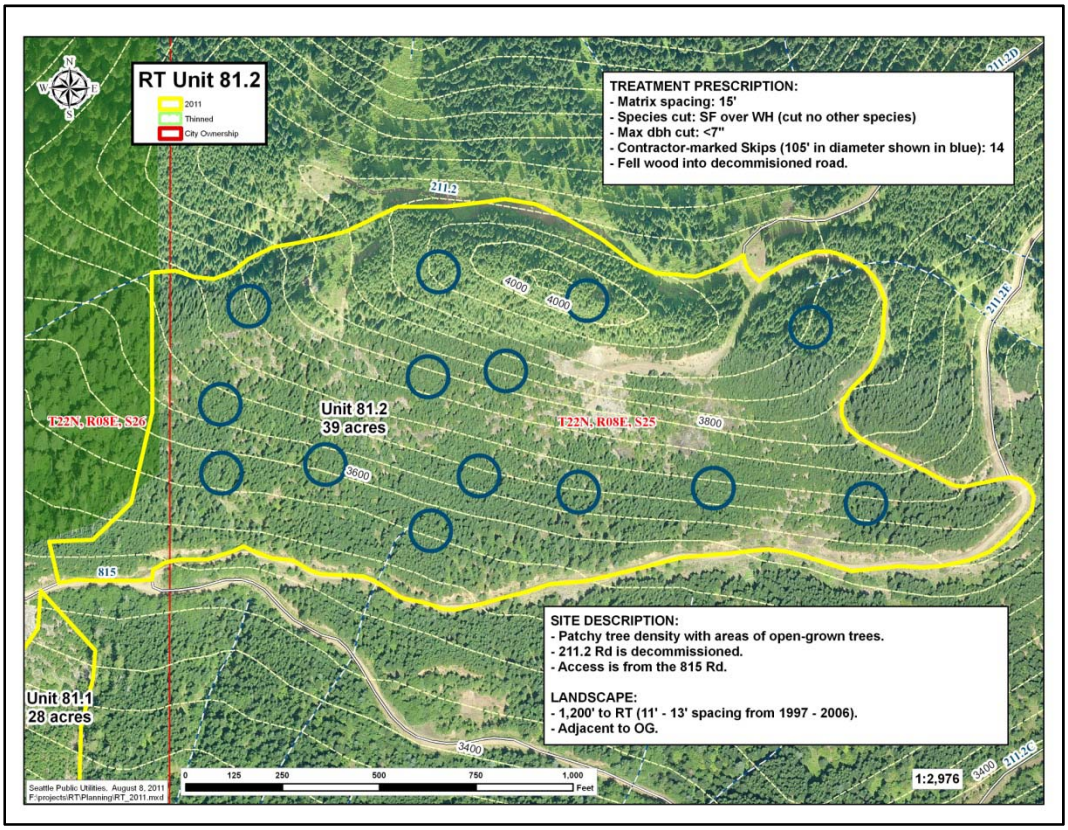
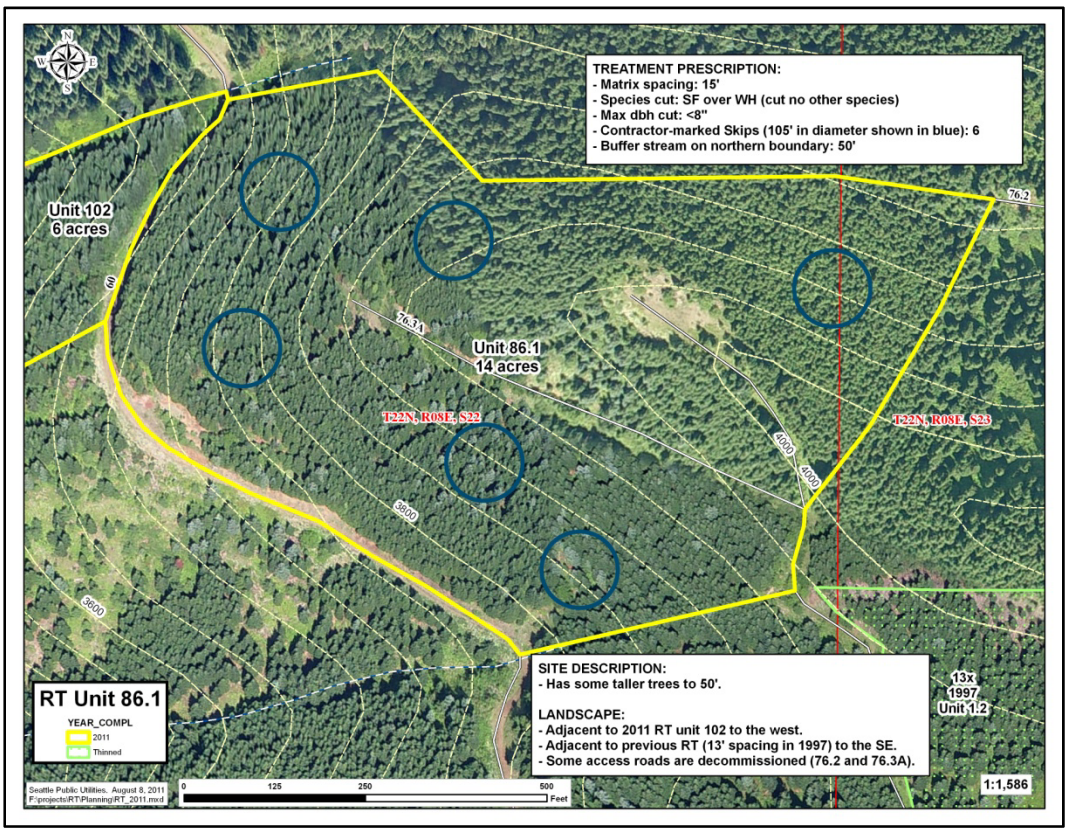
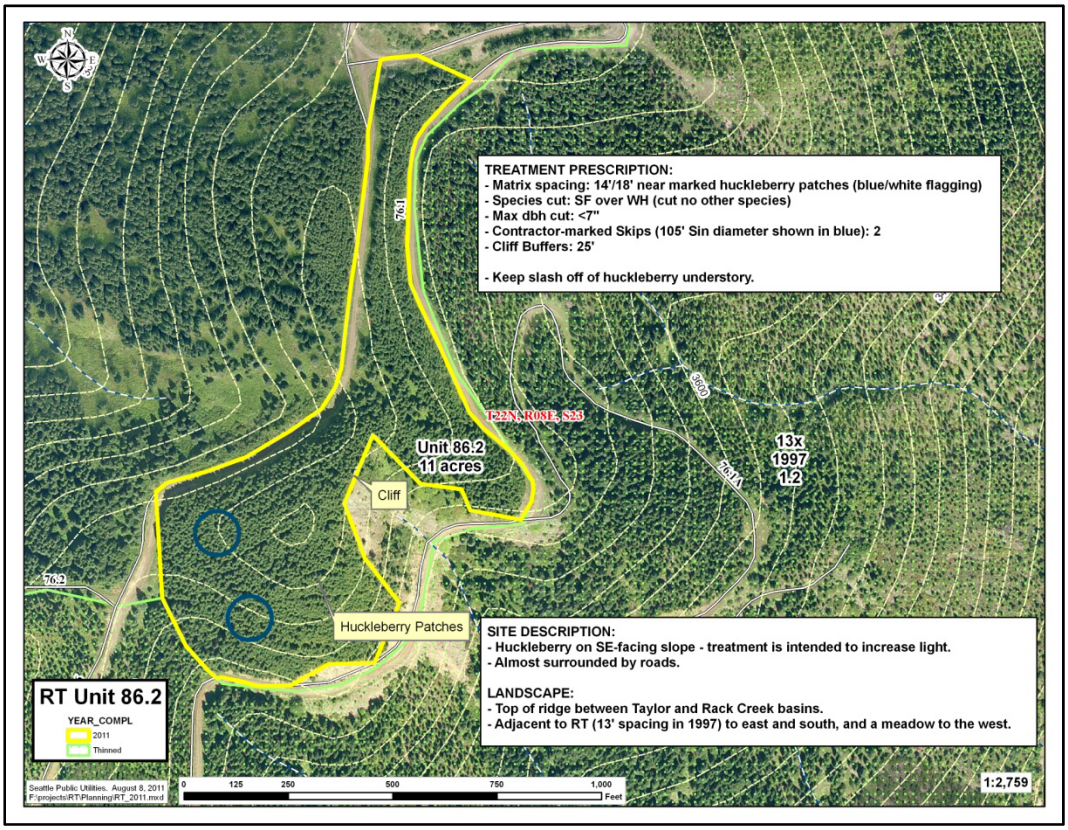
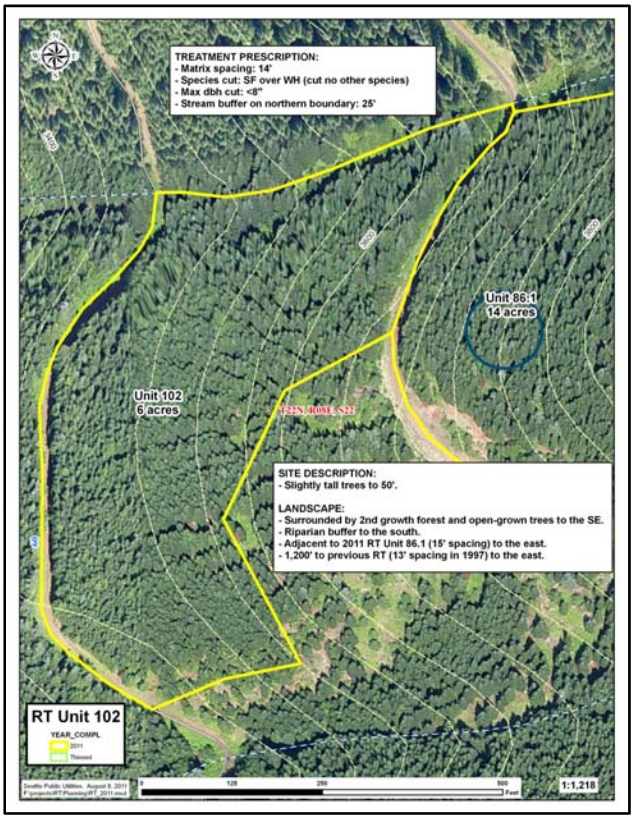

TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 7
13x
1998
1.1
RT Unit 80.5
2011
Thinned
City Ownership
Unit 80.5
17 acres
T22N, R08E, S15
T22N, R08E, S14
13x
2000
1.2
DF, NF 17x; other 14x
2007
4.1
SITE DESCRIPTION:
- Linear skip connecting wet meadow to ridge along SW boundary.
- Buffered potential historic cabin site at NW corner; no obvious sign (e.g., trails).
LANDSCAPE:
- Adjacent to RT (12' - 17' spacing from 1998 - 2007).
- 700' to OG.
0 125 250 500 750 Feet
1:2,280
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd

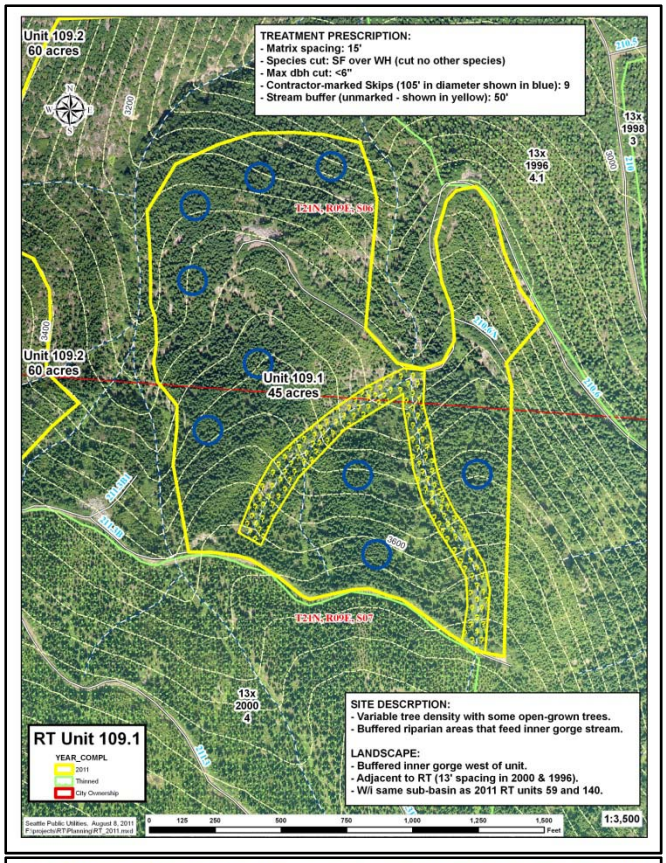

RT Unit 81.1
2011
Thinned
City Ownership
Unit 81.2
39 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 13'
- Species cut: SF over WH over DF (cut no other species)
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 4
- Creek/Inner Gorge Buffer (Contractor installed - shown in yellow): 50'
Unit 81.1
28 acres
T22N, R08E, S26
T22N, R08E, S25
SITE DESCRIPTION:
- Patchy tree distribition with some open-grown areas.
- Steep headwall and inner gorge erosion issues.
LANDSCAPE:
- Adjacent to OG.
- 2,000' to RT (13' spacing in 1997).
- In same basin as 2011 RT units 53, 55, and 67.
0 125 250 500 750 1,000 Feet
1:2,657
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd

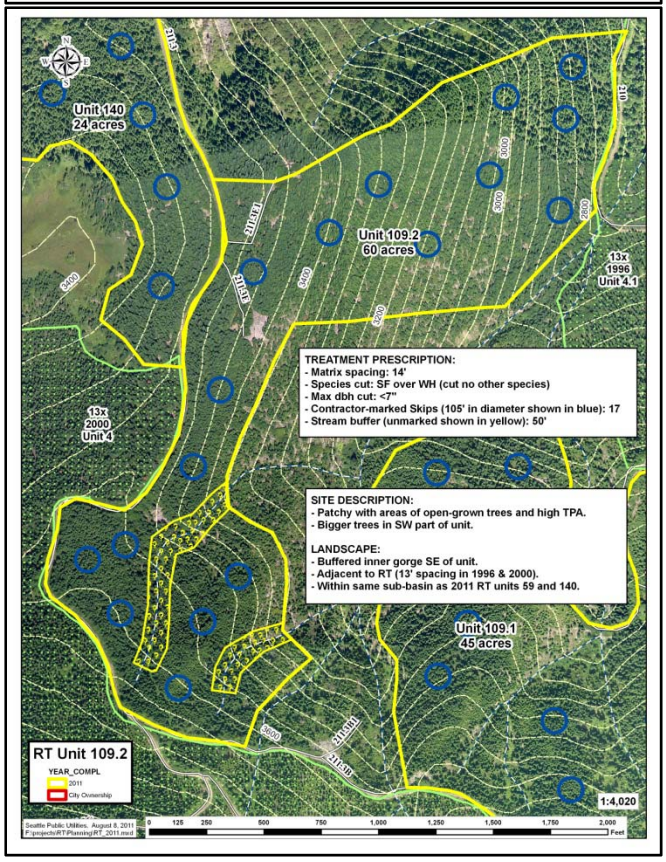

RT Unit 81.2
2011
Thinned
City Ownership
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <7"
- Contractor-marked Skips (105' in diameter shown in blue): 14
- Fell wood into decommisioned road.
211.2
211.2D
211.2E
211.2C
4000
4000
Unit 81.2
39 acres
T22N, R08E, S26
T22N, R08E, S25
3800
3600
815
Unit 81.1
28 acres
3400
SITE DESCRIPTION:
- Patchy tree density with areas of open-grown trees.
- 211.2 Rd is decommissioned.
- Access is from the 815 Rd.
LANDSCAPE:
- 1,200' to RT (11' - 13' spacing from 1997 - 2006).
- Adjacent to OG.
0 125 250 500 750 1,000 Feet
1:2,976
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd

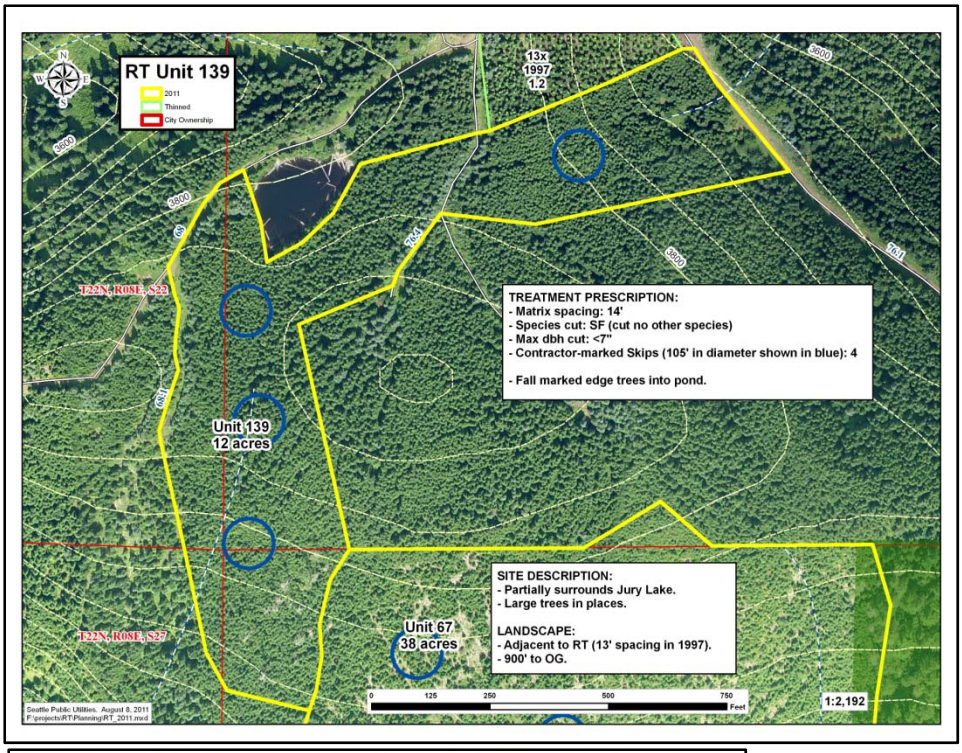

TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <8"
- Contractor-marked Skips (105' in diameter shown in blue): 6
- Buffer stream on northern boundary: 50'
Unit 102
6 acres
76.2
76.3A
Unit 86.1
14 acres
T22N, R08E, S22
T22N, R08E, S23
4000
4000
3800
3800
RT Unit 86.1
YEAR_COMPL
2011
Thinned
SITE DESCRIPTION:
- Has some taller trees to 50'.
LANDSCAPE:
- Adjacent to 2011 RT unit 102 to the west.
- Adjacent to previous RT (13' spacing in 1997) to the SE.
- Some access roads are decommissioned (76.2 and 76.3A).
13x
1997
Unit 1.2
0 125 250 500 Feet
1:1,586
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd

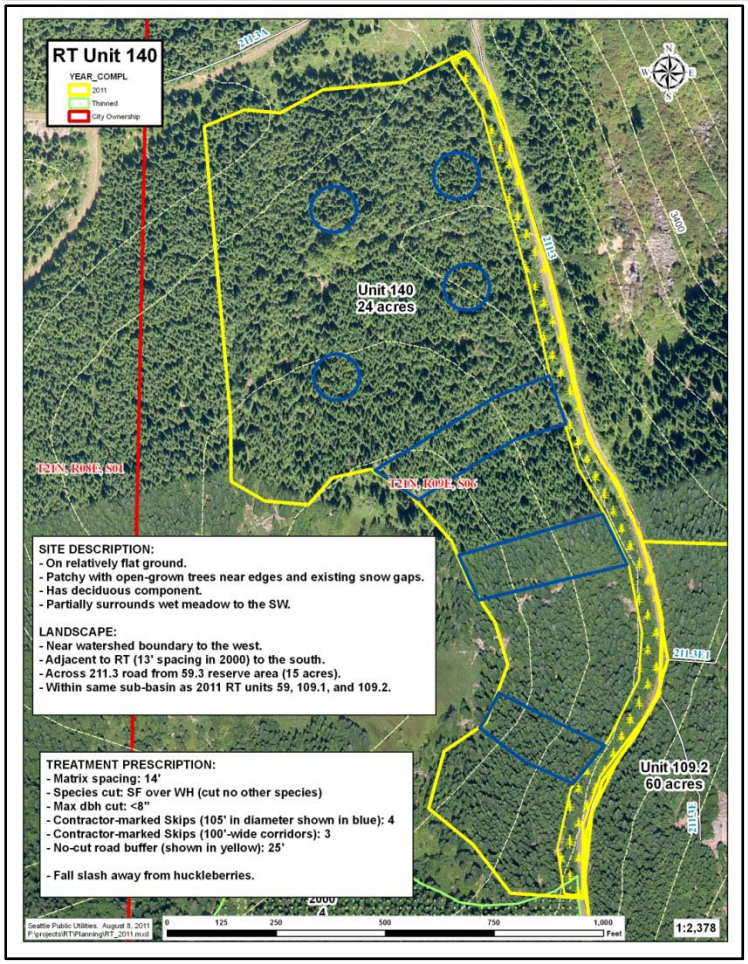

TREATMENT PRESCRIPTION:
- Matrix spacing: 14'/18' near marked huckleberry patches (blue/white flagging)
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <7"
- Contractor-marked Skips (105' Sin diameter shown in blue): 2
- Cliff Buffers: 25'
- Keep slash off of huckleberry understory.
T22N, R05E, S23
Unit 86.2
11 acres
Cliff
13x
1997
1:2
Huckleberry Patches
SITE DESCRIPTION:
- Huckleberry on SE-facing slope - treatment is intended to increase light.
- Almost surrounded by roads.
LANDSCAPE:
- Top of ridge between Taylor and Rack Creek basins.
- Adjacent to RT (13' spacing in 1997) to east and south, and a meadow to the west.
RT Unit 86.2
YEAR_COMPL
2011
Thinned
1:2,759


TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <8"
- Stream buffer on northern boundary: 25'
Unit 86.1
14 acres
Unit 102
6 acres
T22N, R05E, S23
SITE DESCRIPTION:
- Slightly tall trees to 50'.
LANDSCAPE:
- Surrounded by 2nd growth forest and open-grown trees to the SE.
- Riparian buffer to the south.
- Adjacent to 2011 RT Unit 86.1 (15' spacing) to the east.
- 1,200' to previous RT (13' spacing in 1997) to the east.
RT Unit 102
YEAR_COMPL
1:1,218


Unit 109.2
60 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 15'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <6"
- Contractor-marked Skips (105' in diameter shown in blue): 9
- Stream buffer (unmarked - shown in yellow): 50'
13x
1998
3
13x
1996
4.1
T21N R9E S06
Unit 109.2
60 acres
Unit 109.1
45 acres
T21N R9E S07
13x
2000
4
SITE DESCRPTION:
- Variable tree density with some open-grown trees.
- Buffered riparian areas that feed inner gorge stream.
LANDSCAPE:
- Buffered inner gorge west of unit.
- Adjacent to RT (13' spacing in 2000 & 1996).
- W/i same sub-basin as 2011 RT units 59 and 140.
RT Unit 109.1
YEAR_COMPL
2011
Thinned
City Ownership
1:3,500


Unit 140
24 acres
Unit 109.2
60 acres
13x
1996
Unit 4.1
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <7"
- Contractor-marked Skips (105' in diameter shown in blue): 17
- Stream buffer (unmarked shown in yellow): 50'
13x
2000
Unit 4
SITE DESCRIPTION:
- Patchy with areas of open-grown trees and high TPA.
- Bigger trees in SW part of unit.
LANDSCAPE:
- Buffered inner gorge SE of unit.
- Adjacent to RT (13' spacing in 1996 & 2000).
- Within same sub-basin as 2011 RT units 59 and 140.
Unit 109.1
45 acres
RT Unit 109.2
YEAR_COMPL
2011
City Ownership
1:4,020


RT Unit 139
2011
Thinned
City Ownership
13x
1997
1.2
T22N, R08E, S22
T22N, R08E, S27
Unit 139
12 acres
Unit 67
38 acres
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF (cut no other species)
- Max dbh cut: <7"
- Contractor-marked Skips (105' in diameter shown in blue): 4
- Fall marked edge trees into pond.
SITE DESCRIPTION:
- Partially surrounds Jury Lake.
- Large trees in places.
LANDSCAPE:
- Adjacent to RT (13' spacing in 1997).
- 900' to OG.
0 125 250 500 750 Feet
1:2,192
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd


RT Unit 140
YEAR_COMPL
2011
Thinned
City Ownership
T21N, R08E, S01
T21N, R09E, S06
Unit 140
24 acres
Unit 109.2
60 acres
SITE DESCRIPTION:
- On relatively flat ground.
- Patchy with open-grown trees near edges and existing snow gaps.
- Has deciduous component.
- Partially surrounds wet meadow to the SW.
LANDSCAPE:
- Near watershed boundary to the west.
- Adjacent to RT (13' spacing in 2000) to the south.
- Across 211.3 road from 59.3 reserve area (15 acres).
- Within same sub-basin as 2011 RT units 59, 109.1, and 109.2.
TREATMENT PRESCRIPTION:
- Matrix spacing: 14'
- Species cut: SF over WH (cut no other species)
- Max dbh cut: <8"
- Contractor-marked Skips (105' in diameter shown in blue): 4
- Contractor-marked Skips (100'-wide corridors): 3
- No-cut road buffer (shown in yellow): 25'
- Fall slash away from huckleberries.
0 125 250 500 750 1,000 Feet
1:2,378
Seattle Public Utilities, August 8, 2011
F:\projects\RT\Planning\RT_2011.mxd

5.0 Lessons Learned

- Quickly after the Ramirez crew started thinning Unit 140, it became apparent that the prescription (14' spacing with 8" diameter limit) was opening the canopy nicely but was resulting in relatively high slash loads. Once the crew adjusted to the diameter limit (they cut some larger trees to start), and in conjunction with skips, residual tree density varied nicely. To limit slash, however, the last three skip areas were converted from 1/5-acre circles to 105'-wide corridors that spanned the unit east-west from the meadow to the road. The size of these three corridors is roughly 2.65 acres. The crew was also asked to buck slash in the area yet to be thinned to get the wood closer to the ground. Even with the mid-treatment changes to the prescription the unit came in under the NTE amount and with 98.9% quality.

    - *Lesson:* Be ready to adjust prescription quickly based on dissatisfaction with the application of the original treatment.

- A couple of issues came up in Unit 139. Roughly 25-30 trees adjacent to Jury Lake had been marked with blue paint to drop into the lake to augment amphibian habitat, with the intent that all other trees would be felled away from the lake. But the Coronel crew started thinning at the lake which meant it was easier to drop trees toward the lake than away from it, resulting in more trees in the water than originally desired. This practice was halted about a third of the way around the lake, and after consultation with Heidy Barnett (SPU amphibian expert), it was decided that no remedy was required (e.g., there was not too much wood in the water and the area of known amphibian use [northeast end of the lake] was not impacted).

  The second issue with Unit 139 involved the disregard for diameter limits over a portion of the unit, primarily southwest from the lake. This error resulted in cutting more trees than was prescribed. While contractors adhered to the diameter limit in other portions of the unit, the overall thinning quality for the unit was only 77.8%.

    - *Lesson One*: Beware of your assumptions and be clearer than you think you might need to be. I assumed that the crew would start at the other side of the unit and have the freedom to fall trees away from the lake. Starting at the lake did not allow this freedom.

    - *Lesson Two*: Reiterate the fundamentals of each prescription to the contractor as often as possible. Mentioning the spacing, diameter limits, and species not to cut cannot be done enough. Provide contractors with string cut to the diameter limit at the beginning of each unit to help demonstrate the priority of diameter limits over spacing. Show differences between species using branch samples to illustrate species preferences.

- In some units the diameter limit comes into play more than others. In the units where the diameter limit forces adjustments in spacing (which is sometimes the intention), it can be difficult for crews to initially layoff cutting trees near the diameter limit, resulting in cutting too many trees.
    - *Lesson One*: Repeatedly communicate the importance of the diameter limit to the contractor, that it is desired to have variable tree density throughout the unit, and that the reason SPU pays by the hour is to take the onus off of the speed of thinning.
    - *Lesson Two*: Be clear during prescription development about the difference between ignoring trees above the diameter limit when spacing the thinned trees below the diameter limit, and spacing from trees above the diameter limit. The former will result in maintaining more trees per acre than the later, but also potentially more variability in tree densities.
- Not-to-exceed (NTE) payment amounts were established for each unit based on 125% of the successful bid amount developed by the contractor. Awards were made to contactors based on bid amounts, logical groups of units (e.g., those in the same geographic area), and the assumption that on average the amount billed would be less than the NTE amount. In practice, however, the overall cost (e.g., the amount billed) to one of the contractors exceeded the overall NTE amount ($3,433.50 for Ramirez). Out of respect for the honest work these companies provide and considering that the contractor budget was under spent in 2011, a different system might be fairer to the contractor.
    - *Lesson One*: Though the existing system does encourage honest bidding, maybe the NTE amount should be a higher percentage of the successful bid amount (e.g., 133%).
    - *Lesson Two*: During unit viewing in the bidding process, repeatedly reiterate the details of each prescription, particularly those that could affect treatment time (e.g., diameter limits, girdling, slash treatment). Overtly state that they may want to add time to account for certain features. While at some point you have to trust that the contractor understands their business, a bid cannot be accurate unless they really understand the treatment.
- With two thinning crews working concurrently through most of the 6-week season, two SPU staff were generally able to keep up with compliance/post-treatment plots (one plot/two acres thinned). In most of the units one of the staff were able to be there to discuss to quality with the contractors soon after thinning started. A couple of times during the season, however, there was push to keep up, especially when both crews had over 10 members.
    - *Lesson*: Keeping a steady pace at data collection over the course of the season helps to keep from getting behind and/or burned out.

- Particularly towards the beginning of the season, conversations of compliance staff centered on the possible divergence of accuracy of treatment application versus the overall ecological benefits of the treatment. In other words, how strictly do we administer compliance with prescriptions with the greater overall ecological benefit of the treatment? Is it OK that some noble trees were erroneously thinned?
    - *Lesson*: While keeping the contractor on target is important, do not lose sight of the greater ecological benefit of thinning at all spatial and temporal scales. Continue to reinforce species preferences, using samples of the species with which there are issues to make it clear to the thinners.
- A compliance monitor will typically see tree species thinned that were not supposed to be cut while moving between plots instead of in plots. This usually means that it is not figured into the quality calculation and thus the contractor is seldom officially penalized for cutting rare species.
    - *Lesson*: Though the contracts signed with the thinning companies specifies acceptable compliance measures, the contractors should be reminded as often as is useful about the trees species they should and should NOT be cutting. Discuss whether to include a penalty ($/tree) for cutting "no-cut" species in the next contract.
- One of the contractors (Coronel) increased their billing rates from the original contract without first following the process to amend the contract. In hindsight, the contractor used the erroneous rates throughout the 2011 bidding process, but it was not detected by SPU until an audit of the final invoice downtown. The contracted billing rates were sent to each contractor in their original 2011 bid packets and it was assumed the correct rates were being used. After much discussion, the contractor provided corrected invoices using the contract billing rate and was paid $4,828 or 7.3% less than they originally billed.
    - *Lesson*: Do not make assumptions when it comes to finances. Keep good detailed records of all transactions. It is better to be overt and transparent in dealing with finances and budgets from the beginning, than to suffer potential shortfalls or risk the contractor relationship from poor communication.
- Nuts and bolts:
    - Post-treatment tree density targets were generally based on pre-treatment tree sizes and species, with higher residual densities in units with smaller trees. Thinning diameter limits were intended to both increase density variability and maintain the larger trees in each unit. As intended, the diameter limits chosen for each unit prescription came into play during the treatment, especially in units with larger trees (e.g., units 80.5, 140, 86.1).

- Using one size of skip was logistically simpler to administer in the field than implementing multiple sizes, but it is also ecologically justifiable given the variability of pretreatment conditions. Though no plots were taken in the skips, post-treatment conditions in the skips varied within each unit, often from several thousand trees per acre to open grown trees with large crowns.
- Gaps were generally not utilized in 2011 because of relatively high pretreatment tree density variability, concerns over soil stability on steep slopes, and existing tree species diversity. Going forward, the primary objective of planting gaps is to actively increase species diversity as a climate change adaptation strategy.
- Streams were generally buffered with no-cut acreas of 25-50' on either side. This conservative approach was used to mitigate potential erosion on steep ground and to simplify the administration of the contract.
- Treatment along old-growth forest edges varied from thinning under large snags along the edge (Unit 67) to buffering the edge with a slightly higher tree density (Unit 56.2B).
- Sanicans are a continuing issue with lending contractors appropriate trailer hitches, weekly transportation back to Cedar Falls for cleaning, and proper storage of associated stuff (e.g., toilet paper, wheel chocks, bowl plug) prior to transport. Just part of doing business in the watershed. Remind contractors that they are responsible for having appropriate sized ball hitch to haul sanicans.
- A low-band radio was lent to Coronel for the season as a safety measure in case of accident. No radio was available to Ramirez. Cell phone coverage exists from some ridges in the watershed but is very spotty. Though no emergencies occurred during the 2011 thinning season, a formal communication strategy should be developed and made available to the contactors.
- Remember to keep a daily log (either in the "Black n' Red" book or on the computer) of where each crew is working every day. This can be used to validate hours billed on the contractor invoices.

6.0 Basic Status of RT Program in the CRMW

2011 was the 12th year of the RT program under the CRW-HCP. Prior to the adoption of the CRW-HCP in 2000, SPU supported a pre-commercial forest thinning program analogous to RT, albeit with different goals and prescriptions. Table 3 summarizes the acres of young forest treated under these programs.

Table 3. Summary of the RT program in the CRMW.

Management	Year	Acres Treated	Treatment Summary						
			# Subunits	Thinning Spacing (ft)	Maximum Diameter Limits	Skips	Gaps	Slash Treatment	Girdling
Pre-HCP	1995	590	28	12	Y	N	N	N	N
	1996	671	7	13	Y	N	N	N	N
	1997	455	2	6-13	Y	N	N	N	N
	1998	166	2	13	Y	N	N	N	N
	1999	0							
CRW-HCP	2000	499	8	13	Y	N	N	N	N
	2001	1,282	9	15	Y	N	N	N	N
	2002	1,372	8	15	Y	N	N	N	N
	2003	1,154	14	12-15	Y	N	N	N	N
	2004*	1,017	16	13-16	Y	N	N	Y	N
	2005	683	17	12-18	Y	N	Y	Y	N
	2006**	362	13	11-17	Y	Y	Y	Y	N
	2007	637	25	12-18	Y	Y	Y	Y	N
	2008	699	43	8-18	Y	Y	Y	Y	Y
	2009	598	19	10-18	Y	Y	Y	Y	Y
	2010	573	27	12-18	Y	Y	Y	Y	N
	2011	482	20	13-18	Y	Y	N	Y	Y
Total	Non-HCP	2,299							
	HCP	8,941							
Grand Total		11,240							

*Includes 370 acres (Selleck and Foothills) funded by BPA (non-HCP).

**Includes 47 acres (Trillium) funded by BPA (non-HCP).

Funding for the RT program is provided through the CRW-HCP for a total of 15 years. Original targets for this program included treating approximately 10,480 acres with a $2,620,000 budget. There are currently four years left in the stated program with an annual budget of $297,500 with roughly $150,000 for professional services and a target of approximately 1,539 acres. In 2012, the RT program will concentrate on young forest stands at the higher elevations along the northern ridge of the CRMW (e.g., the 110, 120, and 150 road systems) and will integrate restoration planting where possible.